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4.0 POTENTIAL BIOLOGICAL ADVERSE EFFECTS AND TAKE ASSESSMENT

4.1 Adverse Effects

This section addresses the direct, indirect, and cumulative environmental effects of water gathering, water distribution, hydroelectric power production, power transmission activities, and continuation of other land uses including irrigated agriculture, livestock grazing, recreation, fire and weed management, road maintenance and closures, and habitat enhancement and creation, and monitoring for Covered Species described in section 2.

4.1.1 Definitions

The terms below are defined for the purposes of this Plan. Effects and adverse effects are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions, which may have both beneficial and detrimental effects, even if on balance the effect will be beneficial.

Direct effects are defined as activities or projects that remove or alter land cover types, or Covered Species habitat, populations, or occurrences (or portions of thereof). Direct effects are caused by the project and occur at the time and place of project implementation (43 CFR 1508.8; California Public Resources Code § 21068 and 21100). Direct effects can be either permanent (e.g., road maintenance) or temporary (e.g., mowing).

Indirect effects are defined as those that are caused by the proposed action and are later in time or farther removed in distance, but are still reasonably foreseeable (50 CFR 402.02, California Public Resources Code § 21068 and 21100). Indirect effects in the context of this Plan also include those effects that occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., beyond the area of land cover disturbance). While more difficult to detect and track, indirect effects can undermine species viability or habitat quality, especially if multiple indirect or direct effects work cumulatively to impair the species or to degrade the habitat.

Cumulative effect is the effect on the environment, which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

4.1.2 Methods Used to Calculate the Location and Area of Effects

To determine the direct and indirect effects of Covered Activities on Covered Fish Species including habitat, LADWP examined areas of overlap between known locations of the these species and work areas. Because the distribution of OSD is not well known, we assumed that Covered Activities in waterways in the Bishop and Round Valley area waters could affect the fish.

To determine the direct and indirect effects of Covered Activities on the three riparian obligate Covered Species (YBCU, WIFL, and BEVI) and GRSG including habitat,

LADWP used a model approach. LADWP first developed a base vegetation map using imagery from 1999, 2005, and 2009 (Appendix A). Maps were ground-truthed to validate their accuracy; all maps had an accuracy of greater than 85 percent (see for maps Appendix A). Models were then developed that characterized suitable habitat for each species (see Section 3 Habitat Suitability Analysis – Avian Species). Suitable habitat was mapped from the models for each Covered Species. The final step was to overlay LADWP's work areas to identify sites where potential adverse effects including take could occur to determine the potential area of effect.

For some of LADWP activities, the potential acreage of impact on each Covered Species was assessed directly by evaluating the overlap between suitable habitat, infrastructure, and work limits. This type of analysis was done for all waterways and infrastructure as described in Section 2 under Water Gathering and Distribution and Operation and Maintenance of Hydroelectric Power Production, Water Storage Facilities, and Power Transmission Activities. For example, for waterways with channel clearing, the length of the waterway was analyzed with a 50-foot work area on either side of the waterway.

Table 4- 1. Impact Summary

IMPACT SUMMARY								
Activity	Species							
	WIFL		LBVI		YBCU		GRSG	
	(acres)	(%)	(acres)	(%)	(acres)	(%)	(acres)	(%)
Water	52.9	2.5	30.8	2.4	6.8	2.2	137.4	0.5
Power	30.2	1.5	10.5	0.8	0.6	0.2	200.2	0.7
Roads	43.7	2.1	17.3	1.4	6.2	2.0	905.6	3.0
TOTAL	100.9	4.8	56.9	4.5	12.5	4.0	1208.3	4.0

The acreage in this table cannot be summed across the species because acreage for LBVI is included in WIFL.

4.2 Potential Effects from Covered Activities and Anticipated Take of Covered Species

In the following discussion, the evaluation of potential effects is grouped for the purposes of analysis according to the description of Covered Activities presented in Section 2. Unlike Section 2, which provides a description of the activities themselves, this section provides a description of how these Covered Activities affect the Covered Species and their habitats. These descriptions provide an overview of the direct and indirect effects that are likely to result from the Covered Activities.

4.2.1 Water Gathering and Distribution Facilities and Activities

Localized adverse effects to riparian and aquatic habitats may occur around water gathering facilities (e.g., dams, measuring stations and flumes, etc.) and from water gathering activities (e.g., mowing, slushing, burning, etc.).

For water gathering activities, direct effects are assessed quantitatively (Table 4-1); indirect adverse effects are assessed qualitatively (Table 4-2).

Table 4- 2. Direct and Indirect Effect to Covered Species from Water Gathering and Distribution Facilities and Activities.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Dams	Upstream: Saturation of soil and drowning of vegetation from impoundment. Downstream: decreased flows in wet season, increased flows in dry season, and herbicide use could affect water quality.	Harm from fluctuating water levels at reservoirs may limit the opportunity for growth of riparian habitat, managed flows may maintain existing riparian habitat but may cause harm by decreasing the establishment of new or replacement riparian habitat, and mortality from extremely high water levels that could flood nests.	Harm from maintaining reservoir levels at maximum capacity may flood meadow habitat.	Harm from fluctuating water levels and managed flows effects are not expected. Harm from herbicide use is unknown but expected to be minimal given: 1) herbicides licensed for use near waterways have been tested for toxicity to aquatic organisms, 2) the current known distribution of Covered Fish Species, and 3) the strict regulations for municipal water supplies.
Measuring Stations, Flumes, Diversion Structures, Sand Traps, Spillgates, Culverts, Cleaning Obstructions, Preparing for Runoff, Replacing Facilities, and LORP Seasonal Flows	Sediment, vegetation, and trash removal from the work area. Increased turbidity that is of short duration, maintenance of facilities allows for unobstructed water flow, and undesirable species could be spread by equipment used.	Harm from removal of riparian vegetation, harassment from operation of heavy equipment, and failure to maintain facilities may alter quantity and quality of riparian habitat.	Harassment from operation of heavy equipment, mortality from transport and use of equipment	Harm from reduced water quality and reduced spawning habitat, mortality from removal of eggs and fish, and failure to maintain may alter quantity and quality of riparian habitat
Spreading Basins	Undesirable species could be spread by equipment used.	Harm by promoting the establishment and ongoing seed source for tamarisk, no direct effect to riparian habitat.	No spreading basins in Greater Sage-Grouse habitat.	Mortality from stranded OSD during water infiltration.
Mowing	Vegetation removal from the work area, increased turbidity that is localized and of short duration, and undesirable species could be spread by equipment used.	Harm from the removal of riparian vegetation and harassment from operation of heavy equipment.	Harm from removal of upland vegetation, harassment from operation of heavy equipment, and mortality from transport and use of equipment.	Harm from reduced water quality and reduced spawning habitat, mortality from removal of eggs and fish, and failure to maintain may alter quantity and quality of riparian habitat.

Slushing	Sediment and aquatic vegetation removal from the work area, increased turbidity that is of short duration, maintenance of facilities allows for unobstructed water flow, and undesirable species could be spread by equipment used.	Harassment from the operation of heavy equipment.	No slushing in Greater Sage-Grouse habitat.	Harm from reduced water quality and reduced spawning habitat, mortality from removal of eggs and fish, and failure to maintain may alter quantity and quality of riparian habitat.
Burning	Vegetation removal from the work area, increased turbidity and pH that is localized and of short duration, undesirable species are removed, undesirable species may colonize newly denuded areas creating a seed source, maintenance of facilities allows for unobstructed water flow, and undesirable species could be spread by equipment used.	Burning does not occur in woody riparian habitat. Harassment from nearby operation of heavy equipment and harm from undesirable species (e.g., acting as a seed source) that could infiltrate woody riparian habitat. Potential for burns to spread beyond fire line and cause mortality or injury, or harm by impacting riparian habitat.	No burning in GRSG habitat	Harm from reduced water quality, mortality of eggs and fish and failure to maintain may alter quantity and quality of riparian habitat.
Atypical Events/Emergencies	Various but could include habitat loss.	Loss or degradation of habitat and mortality, injury or harm may occur.	Loss or degradation of habitat and mortality, injury or harm may occur.	Loss or degradation of habitat and mortality, injury or harm may occur
Maintain Groundwater Pumps	Vegetation removal from the work area and undesirable species could be spread by equipment used.	Harassment from operation of heavy equipment.	No groundwater pump maintenance in Greater Sage-Grouse habitat.	No groundwater pump maintenance in waterways.
Removing Beaver Dams with helicopter	Sediment and vegetation removal from the work area, increased turbidity that is of short duration and undesirable species could be spread by equipment used.	Harm from removal of riparian vegetation and harassment from operation of heavy equipment.	None Expected	Harm from reduced water quality and reduced spawning habitat, mortality from removal of eggs and fish and failure to maintain may alter quantity and quality of riparian habitat.

The direct effects to Covered Species from Water Gathering Activities vary. No adverse effects on OP or LVSD are expected because infrastructure and work areas do not overlap current occurrences. OTC only occurs in one location with LADWP infrastructure, 8 miles of the Upper Owens Gorge. Approximately 250 feet of river in upper Owens River Gorge may have channel vegetation, sediment or other obstructions removed from of this 8-mile reach, which may harm OTC. All irrigation ditches in Bishop and Round Valley that OSD inhabit may have vegetation, sediment or other obstructions removed to maintain flow and capacity, which could result in direct mortality or injury. Water gathering and distribution activities may harm or harass GRSG on up to 137.4 acres (0.05 percent of all potential habitat) where these activities occur on potential GRSG habitat. Water gathering and distribution activities may harm or harass riparian obligate birds. This includes 6.8 acres or 2.2 percent is suitable YBCU habitat, 52.9 acres or 2.5 percent is suitable SWFL habitat, and 30.8 acres or 2.4 percent is suitable LBVI habitat that overlaps infrastructure. This evaluation represents the maximum area of overlap between suitable habitat and water gathering facilities and activities (see Appendix A).

Covered Activities may have indirect adverse effects on Covered Species. Covered Species may be harassed by the operation of heavy equipment and associated noise, increased dust; increased light pollution at night (e.g., fire suppression at night). Covered Species may be killed, injured or harmed by increased competition, predation, or habitat alteration by undesirable species; spills of hazardous materials (e.g., operation of heavy equipment and vehicles); increased frequency of wildfire ignition (e.g., use of power tools, catalytic converters from vehicles); and greenhouse gas emissions (e.g., operation of heavy equipment). See Climate Change below. These effects are difficult to quantify. However, we do not expect their levels in the future to differ substantially from those that have occurred during the past 100 years.

4.2.2 Operations and Maintenance of Hydroelectric Power Production, Water Storage Facilities, and Power Transmission Activities

Localized adverse effects to riparian and aquatic habitats may occur around hydropower and water storage facilities (e.g., reservoirs, fences, etc.). The adverse effects of some activities have been discussed elsewhere including the operation of dams, mowing, and fencing (see Table 4-2). Other activities specific to this category and their adverse effects are discussed here. LADWP maintains 700 miles of distribution and transmission lines.

For operations and maintenance of hydroelectric power production, water storage facilities and power transmission activities, direct effects are assessed quantitatively (Table 4-1); indirect adverse effects are assessed qualitatively (Table 4-3).

The direct effects to Covered Species from power transmission activities vary. No adverse effects on OSD, OP, or LVSD are expected because infrastructure and work areas do not overlap current occurrences. Power transmission activities may harm or harass GRSG on up to 200.2 acres (0.07 percent of all potential habitat) where these activities occur on potential GRSG habitat, 0.6 acres, or 0.2 percent is suitable YBCU habitat, 30.2 acres or 1.5 percent is suitable SWFL habitat, and 10.5 acres or 0.8 percent is suitable LBVI habitat that overlaps infrastructure. This evaluation represents the maximum area of overlap between suitable habitat and power lines including a 100 foot buffer.

Table 4- 3. Direct and Indirect Effects of Operation and Maintenance of Hydroelectric Power Production, Water Storage Facilities, and Power Transmission Activities on Covered Species.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Power line inspection by helicopter.	Localized and temporary increase in noise and air pollution.	Harassment from equipment use.	Harassment from equipment use.	None anticipated.
Power line clearance by tree trimming using power tools.	Removal of limbs, disease spread to species trimmed.	Direct mortality and nest loss, harm from habitat loss, harassment from presence of personnel and equipment.	Harassment from presence of personnel and equipment.	Harm from localized and temporary reduction in water quality.
Tower inspection, washing porcelain insulators.	None anticipated	Localized and temporary harassment from presence of personnel and equipment.	Localized and temporary harassment from presence of personnel and equipment.	None anticipated.
Replacement of poles, cross arms, and transformers	Vegetation removal around work area, localized ground disturbance; potential for hazardous material spill from transformers.	Localized and temporary harassment from presence of personnel and equipment.	Localized and temporary harassment from presence of personnel and equipment.	Localized and temporary harassment from presence of personnel and equipment, harm from localized and temporary reduction in water quality.

4.2.3 Irrigated Agriculture

The amount of water delivered for irrigated agriculture is regulated under the Water Agreement; therefore, it is not a Covered Activity in this HCP. Covered Activities related to pasture maintenance and operation will include mowing, dragging, operation of irrigation equipment such as center-pivot sprinkler systems, and weed management. Not all lessees mow or drag their pastures, and only a few pastures have sprinkler systems. Mowing or dragging would occur at most, once per year.

Table 4- 4. Direct and Indirect Effects of Irrigated Agriculture on Covered Species.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Mowing	Vegetation removal from the work area; increased turbidity that is localized and of short duration; and undesirable species could be spread by equipment used.	Harm from removal of riparian vegetation and habitat degradation from introduction of undesirable species; and harassment from operation of heavy equipment.	Harm from removal of upland vegetation and habitat degradation from introduction of undesirable species; harassment from operation of heavy equipment; and mortality from transport and use of equipment.	Harm from reduced water quality, reduced spawning habitat, and habitat degradation from introduction of undesirable species; mortality from removal of eggs and fish and failure to maintain this activity may alter quantity and quality of riparian and aquatic habitat.
Dragging	Undesirable species could be spread by equipment used.	Harassment from operation of heavy equipment and harm from habitat degradation from introduction of undesirable species.	Harassment from operation of heavy equipment; mortality from transport and use of equipment, and harm from habitat degradation from introduction of undesirable species.	Harassment from operation of heavy equipment, harm from habitat degradation from introduction of undesirable species.
Operation and maintenance of irrigation equipment	Undesirable species could be spread by equipment used	Harassment from operation of heavy equipment, harm from habitat degradation from introduction of undesirable species	Harassment from operation of heavy equipment, harm from habitat degradation from introduction of undesirable species	Harassment from operation of heavy equipment, harm from habitat degradation from introduction of undesirable species
Irrigation including flood and sprinkler systems.	Temporal inundation, maintains pastures or croplands, potential spread of undesirable species present in waterway	Harm from habitat degradation from introduction of undesirable species; pastures may increase foraging habitat ¹	Harm from habitat degradation from introduction of undesirable species; pastures may increase foraging habitat ¹	Mortality from stranding; harm from habitat degradation from introduction of undesirable species

1. Increase foraging habitat for Covered bird Species is an ancillary benefit of irrigated agriculture.

OSD are presumed to be present in all irrigation waterways in Bishop and Round Valley and may be killed by stranding or harmed from fluctuating available habitat. There is no irrigated agriculture near LVSD, OP, or OTC.

Based on the analysis conducted, irrigated lands overlap areas supporting riparian vegetation on 238 acres. No cultivated agriculture (alfalfa and hay) areas overlap riparian vegetation. Areas of overlap were evaluated for each riparian obligate species and GRSG. Irrigated pasture overlapped 5,603 acres of potential GRSG habitat, 7.7 acres of YBCU habitat, 4.2 acres of SWFL habitat, and 0 acres of LBVI habitat. Areas of overlap with the three riparian obligate species likely represent an overestimate of actual overlap due to the nature of the mapping products available.

The scale of the mapping is such that in most cases, riparian vegetation covers only a small portion of the polygon classified as “irrigated agriculture.” GRSG use irrigated pastures or portions of some irrigated pastures for lekking in spring and for brooding and foraging, especially during late summer and fall. Mowing and dragging are pasture management practices that improve the health of the pasture. Mowing or dragging of pastures may result in harassment by temporarily disturbing birds, causing them to leave the area. Riparian obligate bird species may be harmed by habitat degradation through the removal of vegetation or introduction of undesirable species or harassed by heavy equipment operation.

4.2.4 Livestock Grazing (including fencing)

Livestock grazing, when not adequately managed, can impact riparian and aquatic ecosystems by altering the physical structure of the plant community, plant species composition, plant diversity, and abundance of species, and by altering stream channel morphology and water quality. The consumption of plant biomass by livestock along with trampling, compacts soil, depletes riparian vegetation, reduces plant diversity, and increases soil erosion, resulting in a reduction of animal habitat. The vertical stratification of plant communities, which provides foraging, nesting, breeding habitat and cover for different species, is also reduced. By impacting water quality and potential cover and breeding substrate, habitat for fish species is also reduced. The effects of livestock grazing on Covered Species are presented in Table 4-5. Historic grazing practices likely resulted in adverse effects to all aquatic, riparian, and upland habitats in the Plan Area.

Table 4- 5. Direct and Indirect Effects by Livestock Grazing on Covered Species habitat.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Livestock grazing	Altering the physical structure of the plant community, plant species composition, plant diversity, and abundance of species; consumption of plant biomass by livestock; undesirable species may colonize newly denuded areas creating a seed source; soil compaction and trampling; alters stream channel morphology and water quality; bank destabilization, increased runoff, sedimentation, and erosion; reduced capacity of soils to hold water.	Harm from the reduction or degradation of riparian vegetation; harassment from presence of livestock; mortality from knocking down nests; harm from potentially maintaining altered habitat that favors cowbird use and creating trails that nest predators and people (see Outdoor Recreation below).	Harm from the reduction or degradation of upland vegetation; harassment from presence of livestock; mortality trampling nests;	Harm from reduced water quality (e.g. increased water temperature; nutrient enrichment from urine and feces, etc.) and reduced spawning habitat; mortality from removal of eggs and fish; failure to maintain may reduce aquatic habitat.
Fencing construction and maintenance	Initial loss of vegetation along new fence lines from mowing, disturbance from heavy equipment, undesirable species could be spread by equipment or the fence line could act as an establishment corridor.	Harassment from operation of heavy equipment, harm from reduction of habitat in footprint of fence line.	Harm from fragmenting habitat; and potential for mortality and injury from collisions; harassment from operation of heavy equipment; harm from habitat removal in footprint of fence line, perches for predators	Harassment from operation of heavy equipment.
Supplementation including stock water well development and maintenance.	Increased soil compaction, trampling of vegetation, forage consumption, and erosion.	Harm from reduced or degraded habitat in riparian areas.	Increased harassment by livestock and vehicles used for replenishment near supplements.	Harm from reduced or degraded habitat in aquatic areas.

Direct effects on Covered Species are minimal but may occur. Livestock grazing may directly harm Covered Fish Species by trampling them. Livestock grazing may directly cause mortality by destroying nests (GRSG, SWFL, and LBVI).

Indirectly livestock grazing may harm covered fish species by widening stream channels and collapsing banks resulting in increased stream temperatures, sedimentation, predation and decreased infiltration, spawning and cover habitat.

Livestock grazing occurs in nearly all GRSG and riparian habitat within the Plan Area. One exception is the Mono Basin that has no livestock grazing. Livestock grazing may indirectly cause harm to Covered bird Species by reducing the height, complexity, and cover of vegetation that serves as a refuge from predators and creates a favorable thermal environment for roosting and nesting. In addition, livestock grazing may cause harm by reducing or eliminating the recruitment of trees and shrubs that adversely affects bird diversity and reproductive success (Bock no date).

4.2.5 Outdoor Recreation (including fencing)

As noted in the *SWFL Conservation Strategy* (LADWP 2005), some of the adverse effects of recreation in riparian ecosystems include trampling, clearing, soil compaction, bank erosion, exotic species establishment and spread, fragmented habitat, and increased incidence of fire (LADWP 2005). The effects of outdoor recreation on Covered Species are presented in Table 4-6.

Table 4- 6. Direct and Indirect Effects of Outdoor Recreation on Covered Species.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Outdoor Recreation (e.g. picnicking, fishing, hiking, biking, off-highway vehicle use, sightseeing, camping in developed campgrounds, hunting, and bird-watching, etc.).	Increases soil compaction and bank erosion; alters stream channel morphology and water quality; alters plant community structure, species composition, diversity, and abundance; prevents seed germination; increases the spread and establishment of undesirable species, human caused fires and litter (e.g. food scraps, etc.).	Harm from habitat loss via reduction or degradation of riparian vegetation; harassment from presence of people; mortality from knocking down nests; harm from increases in predators and scavengers due to food scraps and garbage.	Harm from habitat loss via reduction or degradation of upland vegetation; harassment from presence of people; mortality from trampling nests; harm from increases in predators and scavengers due to food scraps and garbage.	Harm from reduced water quality and introduction of non-native predatory species; disturbed spawning habitat causing increased mortality of eggs.

The Plan Area is accessible for Outdoor Recreation with a few exceptions such as power plants that are secured operational facilities (Haiwee Reservoirs), boating on Tinemaha Reservoirs, or seasonal closure of use in Long Valley.

Outdoor recreation may harm Covered fish Species by introducing undesirable species and by degrading water quality. Water quality may be degraded from land and aquatic motorized uses on waterways, or from human trampling that increases sedimentation, bank erosion, and soil compaction.

Outdoor recreation in riparian ecosystems can harm birds through the disturbance of nesting and foraging areas that can cause nest abandonment or harass birds by temporarily affecting their behavior and movement (Bennett and Zuelke 1999). YBCU appear to be more tolerant of recreational activities, even when the activities are close to nests (S. Laymon, PhD., pers comm). GRSG are particularly vulnerable to disturbance during the breeding, brood-rearing, and winter periods, when birds concentrate in large flocks (Bi-State TAC 2012).

4.2.6 Road Maintenance and Use by LADWP Staff

Road maintenance activities include grading of existing roads and closing of redundant roads. Roads that are graded are typically maintained once per year. Redundant roads or roads not needed for grazing, recreation, or infrastructure maintenance access may be closed (Section 5). Closing of roads may involve ripping of roads with construction equipment, and the placement of obstacles preventing access by vehicles. Severely damaged roads (e.g. washed out) are replaced and sometimes realigned.

The direct effects to Covered Species from road maintenance and use by LADWP staff vary. No adverse effects on covered fish species are expected because roads do not overlap current occurrences. Road maintenance and use by LADWP staff may harm or harass GRSG on up to 905.6 acres (3.0 percent of all potential habitat) where these activities occur on potential GRSG habitat, 6.2 acres, or 2.0 percent is suitable YBCU habitat, 43.7 acres or 2.1 percent is suitable SWFL habitat, and 17.3 acres or 1.4 percent is suitable LBVI habitat that overlaps infrastructure. This evaluation represents the maximum area of overlap between suitable habitat and roads including a 50 foot buffer. The effects of roads on Covered Species are presented in Table 4-7.

Table 4- 7. Direct and Indirect Effects of Road Maintenance and Use by LADWP Staff on Covered Species.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Road Grading including adding Road Base as needed	Vegetation removal that is localized and of short duration; undesirable species could be spread by equipment or spread along the disturbance corridor (material source for road base is inspected for undesirable species); short term and localized decrease in air quality; potentially fragmenting habitat; increased road kill; increased recreational use	Harm from loss of riparian vegetation on roads and shoulders; harassment from operation of heavy equipment and increased recreational use, and introduction/spread of undesirable species (see Table 4-6 Outdoor Recreation)	Harm from loss of upland vegetation on roads and shoulders; harassment from operation of heavy equipment and increased recreation use (see Table 4-6 Outdoor Recreation); harm from scavengers and predators drawn to road kill	Harm from reduced water quality caused by increased surface runoff; harassment from increased recreational use (see Table xx Outdoor Recreation)
Ripping and placement of obstacles for Road Closures	Vegetation removal from the work area that is localized and of short duration; undesirable species could be spread by equipment used or take advantage of disturbance corridor; localized temporary decrease in air quality	Temporary one-time harm from removal of riparian habitat on roads and shoulders; Temporary harassment from operation of heavy equipment	Temporary one-time harm from removal of upland habitat on roads and shoulders; Temporary harassment from operation of heavy equipment	Temporary one-time harassment from operation of heavy equipment
Use of roads by LADWP staff	Localized and temporary noise, air pollution, potential spread of undesirable species	Mortality from collision; harassment from vehicle use.	Mortality from collision.	None expected

Grading occurs on existing roads and shoulders, and therefore causes minimal adverse effects to existing habitat. Harassment to Covered Species may occur from the noise from the operation of road graders and associated roadwork. Since graded roads are typically maintained once per year, adverse effects to Covered Species would be temporary and infrequent. As with road grading activities, adverse effects to Covered Species from closing roads would be temporary and ideally occur only one-time for each site. Long-term benefits are expected from the closing of redundant roads as direct and indirect adverse effects from vehicle traffic will be reduced.

4.2.7 Weed Management

Weed management activities include surveys and treating weeds using mechanical and chemical methods. Herbicides and application methods follow regulations from the state of California. Current weed management efforts focus on survey for and treatment of perennial pepperweed, salt cedar, and other common undesirable species (e.g. Russian olive, yellow star-thistle, etc.). These weeds tend to occur in riparian habitats and near aquatic habitats in areas used by all Covered Species, but especially by riparian obligate bird species, for feeding, breeding, sheltering, or moving between habitats.

SWFL is known to nest in salt cedar but the HSI mapping shows limited suitable SWFL nesting habitat in the LORP where most salt cedar removal takes place. In addition, there is limited LBVI habitat in the LORP where Tamarisk removal is occurs. The effects of weed management on Covered Species are presented in Table 4-8.

Table 4- 8. Direct and Indirect Effects of Weed Management on Covered Species.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Surveying - structured surveys on existing roadways and opportunistic surveys on foot or using existing roadways	Undesirable species or disease could be spread by surveyors or equipment used	Harassment from the presence of personnel and the operation of equipment	Harassment from the presence of personnel and the operation of equipment	Harassment from the presence of personnel and the operation of equipment;
Mechanical removal of non-native tree species	Direct removal of vegetation that could be used for feeding, breeding, shelter, or movement between habitats; undesirable species could be spread by equipment used	Mortality from nest loss; harm from removal of vegetation that could be used for feeding, breeding, shelter, or movement between habitats; harassment from personnel using hand or power tools, or the operation of heavy equipment	Harassment from personnel using hand or power tools, or the operation of heavy equipment.	Harassment from personnel using hand or power tools, or the operation of heavy equipment; falling limbs may enter the waterway causing mortality or harm from increased sedimentation
Spraying of herbicide via a low-volume sprayer attached to a vehicle such as an ATV or truck or a low-volume backpack sprayer carried by a person on foot. This does not include aerial spraying.	Mortality of adjacent, non-target species; Undesirable species could be spread by personnel or equipment	Harm from habitat loss from removal of target weeds as well as unintentional removal of desirable species; harm from habitat loss associated with treatment activities (e.g. ATV tracks), harassment from personnel or operation of heavy equipment	Harm from habitat loss from unintentional removal of adjacent desirable species; harassment from personnel or operation of heavy equipment	Harassment from operation of equipment; harm from herbicide use is unknown but expected to be minimal given 1) herbicides licensed for use near waterways have been tested for toxicity to aquatic and 2) the strict regulations for municipal water supplies.

Weed management activities could result in direct mortality from nest loss, or indirectly cause harm from habitat loss and harassment from presence of people and equipment.

4.2.8 Wildfire Suppression/Management and Prescribed Fire

LADWP is not seeking coverage for activities related to wildfire suppression. For preventative fire management, LADWP maintains fire breaks (Section 2). Prescribed fire is used to reduce fuel load, reduce biomass, and control woody plant encroachment on some City lands. Prescribed fire activities include developing fire breaks, burning, and monitoring. Post wildfire and prescribed recovery activities include flow management, resting grazing leases, limiting access, or monitoring.

LADWP implements prescribed burns cumulatively covering up to 1,000 acres (individual burns not greater than 500 acres) annually. These activities could result in substantial harm to Covered Species from habitat loss. The effects of prescribed fire on Covered Species are presented in Table 4-9.

Table 4- 9. Direct and Indirect Effects of Preventative Wildfire Management and Prescribed Fire on Covered Species. **Wildfire suppression is not a Covered Activity.**

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Mowing/grading fire breaks.	Vegetation removal from the work area; increased turbidity, dust, and noise that is localized and of short duration; undesirable species could be spread by equipment used or take advantage of disturbance corridor; localized temporary.	Harm from removal of riparian vegetation; harassment from operation of heavy equipment.	Harm from removal of upland vegetation; harassment from operation of heavy equipment.	Harm from reduced water quality.
Prescribed burns and post wildfire recovery activities.	Reduced air quality; potential for spread and establishment of undesirable species; potential for prescribed fire to spread to unintended areas; vegetation removal.	Mortality, injury, and harm from burn; harm from removal of riparian vegetation and temporary fragmentation of habitat.	Mortality, injury, and harm from burn; harm from removal of upland vegetation and temporary fragmentation of habitat.	Harm from reduced water quality, removal of emergent and riparian vegetation, or increased erosion and sedimentation.

4.2.9 Habitat Enhancement and Habitat Creation Activities

Many of the activities described in the sections above are also used for habitat enhancement and habitat creation. Habitat enhancement and habitat creation activities may result in a temporary reduction in the quality or quantity of habitat for Covered Species and their occasional take. LADWP develops, implements, and monitors these activities. Covered Activities include: water gathering (including re-watering of the Lower Owens River), closing roads that cause natural resource impacts, fencing to manage access and movement of recreationists and livestock, implementing livestock grazing and recreation management plans, implementing LADWP's weed management and fire management plans, revegetating areas with native plants, and rotational flooding and burning of wetlands. These activities are intended to improve overall habitat conditions for a variety of plant and wildlife species including but not limited to the Covered Species. Adverse effects of these activities are discussed in various tables above. The effects of habitat enhancement and habitat creation activities on Covered Species are presented in Table 4-10.

Table 4- 10. Direct and Indirect Effects by Habitat Enhancement and Habitat Creation Activities on Covered Species

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Additional Water Supply (e.g. 1600-acre foot mitigation, YBCU enhancement, enhanced flows to promote burn area recovery and riverine health	Decreased terrestrial habitat from flooding to create aquatic habitat;	None expected	None expected	Harm from potential reduction in water quality; stranding;
Planting and seeding native species	Potential spread of undesirable species	Harassment from personnel	Harassment from personnel	None expected
Rotational flooding	Decreased habitat from drying and flooding	Harm from habitat loss from flooding	Harm from habitat loss from flooding	Harm from potential reduction in water quality or habitat loss from drying; mortality from stranding

Any mortality, injury, harm, or harassment to Covered Species from Habitat Enhancement/Creation is expected to be minimal and temporary. The goal of these activities is to enhance or create riparian, aquatic, and upland habitats in areas that may be used by Covered Species.

4.2.10 Additional Monitoring Activities

Environmental monitoring activities are associated with most activities conducted by LADWP in the Plan Area. Some examples of this type of monitoring effort include, the permanent vegetation monitoring transects that are monitored annually to determine the water requirements for native vegetation in some areas, bird surveys, quagga mussel monitoring, water quality monitoring, and spring and seep monitoring and similar activities. The effects of monitoring activities on Covered Species are presented in Table 4-11.

Table 4- 11. Direct and Indirect Effects of Monitoring Activities on Covered Species.

COVERED ACTIVITIES	DIRECT PHYSICAL EFFECTS ON THE ENVIRONMENT	DIRECT AND INDIRECT EFFECTS TO RIPARIAN OBLIGATE BIRDS	DIRECT AND INDIRECT EFFECTS TO GREATER SAGE-GROUSE	DIRECT AND INDIRECT EFFECTS TO COVERED FISHES
Monitoring- structured surveys on existing roadways and opportunistic surveys on foot or using existing roadways	Undesirable species or disease could be spread by surveyors or equipment used	Harassment from the presence of personnel and the operation of equipment	Harassment from the presence of personnel and the operation of equipment	Harassment from the presence of personnel and the operation of equipment;
Electroshocking	Electric charge emitted into waterway; increase in turbidity from personnel working in waterways	Harassment from the presence of personnel and the operation of equipment	Harassment from the presence of personnel and the operation of equipment	Harassment from the presence of personnel, the operation of equipment, and increase in turbidity; direct mortality or injury

Monitoring activities occur throughout the Plan Area but are temporary and local. Mortality from electroshocking is low because electroshocking is limited and does not occur in OP, OTC, or LVSD locations. The low level of OSD mortality that may occur is not expected to have population level impacts. Harassment from monitoring to all Covered Species is expected to be minimal and should not result in persistent habitat degradation or loss.

4.3 Anticipated Take of Covered Wildlife or Fish Species

Take (defined in Section 1.4.1) is anticipated for Covered Species when LADWP implements Covered Activities (see Tables 4-1 through 4-11 above). Most of the Covered Activities have been implemented for several decades, and LADWP is not proposing to conduct new activities. LADWP has modified methods of implementing Covered Activities that may increase habitat available to Covered Species in the future (e.g. livestock grazing practices, removal of sediments from channel banks). LADWP anticipates that this increased habitat availability may increase the population numbers of Covered Species in the Plan Area. With this increase, LADWP's Covered Activities may result in an increase in the amount of take. However, LADWP has also developed and is implementing Conservation Actions designed to reduce the take of Covered Species (see Section 5).

For OSD, LADWP conducts water gathering and distribution, irrigated agriculture, livestock grazing, outdoor recreation, road maintenance, weed management, habitat enhancement, and monitoring activities in the range of the species. These activities could result in the take of OSD and this take could be substantial. For example, channel clearing could result in the take of most OSD in that waterway at that time. However, the activity does not occur in every waterway every year and is required to maintain the waterway's function. LADWP does not conduct Covered Activities in the currently occupied range of LVSD.

For OTC, LADWP operates and maintains a measuring station and access road in the Upper Owens Gorge. These activities could result in take of the OTC in the Owens River. However, LADWP's activities are limited to this one location and only affect a small area of the Owens River. OTC also occurs on LADWP lands at Hot Creek and WMRC. However, these locations are leased to and managed by CDFW and University of California, Los Angeles, respectively, and are not included as Covered Activities.

For OP, LADWP maintains a road by Well 368, fencing around the aquatic habitat at the Well and Warm Springs, conducts monitoring, and manually removes undesirable species as necessary. The area is also periodically grazed by livestock. These activities could result in take of OP. However, LADWP's activities are limited in area and frequency at these locations and only affect a small portion of the population. Failure to maintain the waterway recently resulted in extirpation of the Warm Springs population.

LADWP conducts various Covered Activities within the range of each Covered bird species. These activities could result in take of Covered bird species. For example, water gathering activities could result in the take of LBVI, SWFL, and YBCU. However, the activity does not occur in every waterway every year and is required to maintain the waterway's function. Livestock grazing is the Covered Activity that has the greatest areal extent of effects to Covered bird species including GRSG. However, modification of livestock grazing through alteration of timing and intensity of use can reduce the impact.

4.4 Effects to Critical Habitat for Covered Species

Of the seven Covered Species, only the OTC has designated critical habitat within the Plan Area. Critical habitat is designated from the headwaters of Hot Creek 0.25 mile

and for the eight stream miles below Long Valley Dam on the Owens River (USFWS 1985).

Ongoing and future activities by LADWP at Hot Creek would have no effect to critical habitat. This area is leased to CDFW who operates and maintains a trout hatchery. In the final rule, designating critical habitat the USFWS stated that removal of natural riparian and/or emergent vegetation, except what might be required to maintain an open- water habitat for the Owens tui chub is considered an activity that may adversely modify critical habitat (USFWS 1985). LADWP's activities in the Upper Gorge maintain open water habitat and thus do not adversely modify critical habitat.

LADWP is working with USFWS in the development and implementation of a Conservation Strategy for the YBCU. A Conservation Strategy for SWFL resulted in the exclusion of City lands within the Plan Area from designation as critical habitat for these species. In addition, LADWP has developed and implemented a Conservation Strategy for the Bi-state Distinct Population of the Greater Sage-grouse with the USFWS.

4.5 Cumulative Adverse Effects

Cumulative impacts or cumulative adverse effects result from the proposed actions' incremental impact when viewed together with past, present, and reasonably foreseeable future actions. Cumulative impacts are defined under both the ESA and NEPA. HCPs do not require a discussion of cumulative effects as analyzed under NEPA. Cumulative effects of all projects with a federal nexus will be analyzed under the NEPA process and will not be addressed in the HCP in accordance with the ESA regulatory guidelines. The cumulative projects evaluated in this section are limited to non-federal projects that are not covered by the Plan.

As described above, the adverse effects from implementation of Covered Activities were assessed in the context of existing conditions in the Plan Area. Most of the Covered Activities have been implemented for several decades, and LADWP is not proposing to conduct new activities in this HCP. LADWP has modified their methods of implementing Covered Activities to reduce the adverse effects to Covered Species. This should also reduce the cumulative adverse effects of the Covered Activities on the Covered Species (see Section 5).

Non-Federal Proposed Projects Not Covered in this HCP and Cumulative Effects on Covered Species

LADWP and Inyo and Mono Counties have projects or plans that they are considering in or adjacent to the Plan Area. These future projects/plans are described below.

LADWP has proposed a new project in the Plan Area, the Southern Owens Valley Solar Ranch project. This photovoltaic solar project would be located on 1200 acres in the Owens Valley on LADWP land about 6 miles southeast of Independence and 4 miles west of Manzanar. LADWP would construct a substation but would not build a new transmission line. While the public comment period on this project closed in December 2013 under CEQA, currently there is no information on when the final CEQA document would be release or when the Board of Commissioners would make a decision on its implementation. Thus, it remains a potential project.

The Southern Owens Valley Solar Ranch project would likely result in the loss of upland habitat. It is south of the range of the GRSG and not near riparian or aquatic habitats that could be used by Covered Fish Species and Covered riparian Bird Species. Therefore, if implemented, it should have no adverse effects on Covered Species.

Both Inyo and Mono Counties have activities that are allowed in their General Plans. These planning documents guide current and future land management practices. Under Inyo County's current General Plan, land use adjacent to most LADWP land is designated as Natural Resources except in community areas such as Laws, Bishop, Big Pine, Independence, Lone Pine, Keeler, Cartago, Olancho, and Haiwee. Here the land use plans range from open space recreation to residential high density. In the 2013 draft General Plan, Inyo County is proposing minor changes to the existing General Plan with future development concentrated in existing communities.

Mono County revised the land use element in its General Plan in 2013. As with Inyo County, Mono County's future development policy includes containing growth in and adjacent to existing community areas, and designated most lands outside community areas for uses such as open space, agricultural, and resource management. One goal is to maintain or enhance the integrity of critical wildlife habitat in the county by limiting development in those areas and requiring mitigation in conformance to CEQA and this General Plan. Examples of critical wildlife habitat include, but are not limited to: key winter ranges, holding areas, migration routes, and fawning areas for mule deer; habitat for other big game species; leks, and winter and summer range for sage-grouse; fisheries and associated habitat; and riparian and wetland habitat. In addition, Mono County has limited water availability and this limits the amount, location, and type of future development.

The General Plans for Inyo and Mono Counties support maintaining open space and natural resource issues that include habitat for Covered Species and direct future development to existing communities.

Major projects/changes that have been proposed for Inyo and Mono Counties in/near the Plan Area include:

- Desert Renewable Energy Conservation Plan (land management plan that incorporates renewable energy projects with conservation along US 395 area to Independence)
- Draft renewable Energy General Plan Amendment to identify solar energy development areas (SEDAs) in the portions of the Owens Valley. With respect to the Plan Area, nearby SEDAs include Laws and Owens Lake areas.
- Munro Valley Photovoltaic Solar Project (a 30-acre facility near Olancho on private land that was recently approved),
- Northland Power Photovoltaic Solar Project (a 1,280-acre facility 5 miles east of Independence)
- Fort Independence Hotel and Casino Project (about 240 acres on north side of Independence and west of US 395).
- Sierra Business Park (about 36.7 acres near Mammoth Airport on west side of US 395).

The locations of most of these projects/changes in Inyo and Mono Counties is south of the range of the GRSG and not near riparian or aquatic habitats that could be habitats used by the Covered Fish and Covered riparian Bird Species. The exception is the Digital 395 project and the Sierra Business Park that is located near GRSG habitat. The Digital 395 project would occur along US 395. The Sierra Business Park site was previously used as a concrete batch plant. In their biological assessment, Mono County concluded that the business park would not have significant adverse impacts on the GRSG leks in the project vicinity.

4.6 Climate Change and LADWP Operations

Climate change refers to significant change in measures of climate (such as temperature or precipitation) lasting for an extended period (decades or longer). In California and throughout western North America, there is evidence of a changing climate. In the past 50 years, temperatures in the winter and spring have been warmer, spring snowpack levels have decreased, and snowmelt has been occurring one to four weeks earlier (Union of Concerned Scientists 2008). Average global temperatures have risen more than one degree Fahrenheit and, according to some projections, are expected to rise by 4.7 degrees to 10.5 degrees F by the end of the century (if carbon emissions continue at current rates). In the Sierra Nevada, temperatures have warmed roughly two degrees Fahrenheit since 1979, with perhaps greater warming at higher elevations (Shepard 2008).

Climate change in the Plan Area is expected to increase temperature (air and water), alter precipitation patterns, increase the severity of precipitation events, and increase fire frequency. These changes would likely result in altered flows in waterways, increases in erosion and sedimentation, and altered vegetation communities.

Analysis of climate change adverse effects is imperative to any management planning effort; however, given the ten-year tenure of this HCP, it is unlikely that many of the adverse effects discussed below will be realized within this timeframe. An analysis of climate change scenarios is provided nonetheless as it is imperative that LADWP be able to adapt to, and plan for, adverse effects caused by climate change. Although the adverse effects of climate change are expected to vary regionally, generally the effects are expected to place increased demands on water infrastructure systems.

4.6.1 How LADWP's Covered Activities Would Affect Climate Change

Greenhouse gas emissions from LADWP's Covered Activities would likely decrease from using updated equipment and increasing vegetation growth from changed land management practices. For example, updated equipment includes carbon scrubbers on exhaust pipes of all diesel equipment. LADWP imposes a temporal life span for the operation of equipment based on emissions efficiency. Once this life span is exceeded, the equipment is retired because emissions increase. Vehicles are used that have fewer greenhouse gas emissions and are more fuel-efficient.

LADWP expects that plant cover and plant volume will increase in the Plan Area from implementation of changed management practices (grazing management plans). This increase in vegetation would increase sequestration of carbon from the atmosphere, thus reducing greenhouse gases in the Plan Area.

4.6.2 How Might Climate Change Affect LADWP's Covered Activities

Below is a summary of the adverse effects and potential responses to climate change by LADWP.

Altered flows will alter water supply. LADWP would need to reassess supply facility plans and consider alternative water conservation schemes and allocations e.g., less water may be available for irrigated pastures that are used by Covered Species. In addition, LADWP may need to modify its water gathering facilities to adjust to altered precipitation patterns and increases in the severity of precipitation events (e.g., increases in frequency of maintenance activities associated with culvert and storm water management facilities).

Increases in erosion and sedimentation would impact water quality and water supply infrastructure, and require more frequent maintenance or redesign of the facilities (e.g., measuring stations, flumes, etc.) and waterways.

With altered vegetation communities, LADWP may need to modify its water gathering facilities to protect them from increased risks from wildfire.

4.6.3 How Might Climate Change Affect Covered Species in the Plan Area

The effects of climate change on Covered Species are difficult to predict given current data that are available. We generally assume that for:

Covered fish species: increased water temperature may adversely affect survival and/or reproduction. Reduced precipitation may result in reduced habitat availability especially in late summer and fall. Extreme high flow events may wash covered fish species downstream resulting in injury or mortality. Speckled dace are probably most susceptible to these impacts.

Greater sage-grouse: climate change would likely increase the probability of encroachment of invasive plants and/or catastrophic wildfires followed by encroachment of invasive plants. This would result in the destruction, modification, or curtailment of breeding, nesting, brood-rearing, and wintering habitats.

Riparian obligate birds: riparian habitat may move higher in altitude, north in latitude, or both. This assumes that sufficient water in streams would continue to be present. If not, habitat would likely retract. The timing and availability of prey may change, especially for YBCU because it has a narrow niche prey base. This could result in a mismatch in the timing of prey availability during YBCU breeding season. This may result in lower breeding success or movement of YBCU to other areas.

4.6.4 How Might LADWP's Changes in Covered Activities in Response to Climate Change Affect Covered Species.

Climate change may require LADWP to implement Covered Activities more frequently. These activities would increase the likelihood of take of Covered Species when present.